

We claim:

1. A wheeled structure, comprising:

a body having at least first and second side portions,

first and second sets of wheel elements rotatably attached to the first and second side portions, respectively,

5 wherein a portion of at least one wheel element on a first axis overlaps a portion of at least one other wheel element on a second axis in the same set of wheel elements.

2. The wheeled structure of claim 1 wherein each wheel element has a defined radius, and a portion of at least one wheel element in a set of wheel elements overlaps another wheel element by a predetermined fraction of the radius of the other wheel element.

3. The wheeled structure of claim 1 wherein each set of wheel elements is comprised of at least a first end wheel element, an intermediate wheel element and a second end wheel element.

4. The wheeled structure of claim 3 wherein each wheel element in a set of wheel elements has a respective transverse displacement from a longitudinal centerline of the body, and the transverse displacement of the intermediate wheel element is greater than that of the first end wheel element.

5. The wheeled structure of claim 4 wherein the transverse displacement of the intermediate wheel element is greater than that of the second end wheel element.
6. The wheeled structure of claim 3 wherein the intermediate wheel element in each set of wheel elements is always in contact with the ground plane, and the first end wheel element and the second end wheel element are selectively in contact with the ground plane.
7. The wheeled structure of claim 1 further comprising an axle, rotatably coupled to at least one wheel element, wherein the wheel element is rotatably coupled to the body at a greater transverse displacement from a longitudinal centerline of the body than at least one other wheel element in the set of wheel elements.
8. The wheeled structure of claim 7 wherein each set of wheel elements is comprised of at least a first end wheel element, an intermediate wheel element and a second end wheel element, and wherein the intermediate wheel element is rotatably coupled to the body at a greater transverse displacement from a longitudinal centerline of the body than at least one other wheel element in the set of wheel elements.

9. The wheeled structure of claim 1, wherein the body comprises first and second body portions, the first body portion being connected to the second body portion via an articulation joint.
10. The wheeled structure of claim 9 wherein the articulation joint is a hinge.
11. The wheeled structure of claim 9 wherein the articulation joint is a pivot.
12. The wheeled structure of claim 9 wherein the articulation joint is a flexible body portion.
13. The wheeled structure of claim 9 wherein at least one wheel element from each set of wheel elements is rotatably coupled to each of the first and second body portions.
14. The wheeled structure of claim 1, wherein each set of wheel elements is arrayed with a selected degree of rocker of the wheel elements coupled to the body, to enable the wheeled structure to turn-in-place.

15. The wheeled structure of claim 1, further comprising:

an independent drive element arranged to drive at least one respective wheel element; and

control elements for controlling rotation of the respective wheel elements to enable longitudinal movement, turns or turns-in-place.

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16. The wheeled structure of claim 1, wherein at least one wheel element is comprised of raised blocks spaced apart circumferentially.

17. The wheeled structure of claim 1 wherein at least one wheel element is scalloped.

18. The wheeled structure of claim 1 wherein at least one wheel element is studded.

19. The wheeled structure of claim 16 wherein the portion of at least one wheel element that is capable of contact with the ground is substantially smooth.

20. The wheeled structure of claim 3 wherein at least a portion of the intermediate wheel element in each set of wheel elements is substantially smooth, and at least the first and second end wheel elements in each set of wheel elements is comprised of raised blocks spaced apart circumferentially.

21. A wheeled structure, comprising:

a body, and

a plurality of wheel elements, each wheel element having a peripheral portion, the wheel elements being rotatably coupled to the body such that  
5 the respective peripheral portions of adjacent wheel elements overlap in an elevation view of the structure.

22. The wheeled structure of claim 21, wherein the wheel elements are arrayed such that there is a selected rocker of the wheel elements coupled to the body, to permit any of enhanced turn-in-place or enhanced propulsion on level surfaces.
23. The wheeled structure of claim 22 wherein at least one wheel in a set of wheels is coupled to the body with a transverse displacement from a longitudinal centerline of the body greater than that of other wheels in the respective set of wheels.
24. The wheeled structure of claim 23 wherein the wheel coupled to the body with a greater transverse displacement from a longitudinal centerline of the body is a center wheel in the respective set of wheels.
25. The wheeled structure of claim 21 further comprising:
  - a first set of wheel elements coupled to a port side of the body,
  - a second set of wheel elements coupled to a starboard side of the body,and

5 independent port-side and starboard-side drive elements to permit forward and rearward movement, turns or turns-in-place.

26. The wheeled structure of claim 25, wherein the plurality of wheel elements includes, in plan view, port-side and starboard-side center wheels, and the port-side and starboard-side center wheels, in plan view, are displaced outwardly from the body, relative to other wheels in the respective first and second sets of wheel elements.
27. The wheeled structure of claim 26, wherein at the wheel elements include any of studded or scalloped wheel elements.
28. The wheeled structure of claim 27, wherein the body comprises first and second body portions coupled by an articulation element.
29. The wheeled structure of claim 21, further comprising a flipper element coupled to the body, for making selective contact with a ground plane.
30. The wheeled structure of claim 29, further comprising at least one wheel element, rotatably coupled to the flipper element, for making selective contact with the ground plane.

31. The wheeled structure of claim 30, further comprising a motion control element for controlling movement of the flipper element in an angular direction with respect to the body.
32. A wheeled structure, comprising:
  - a body having at least first and second side portions;
  - first and second sets of wheel elements rotatably attached to the first and second side portions, respectively;
  - 5 a flipper element pivotally coupled to a portion of the body; and
  - a drive module integrated in combination with the flipper element to control the movement of the flipper element between a stowed position and a forward position where said flipper element can make selective contact with a ground plane.
33. The wheeled structure of claim 32 further comprising at least one wheel element rotatably coupled to the flipper element.
34. The wheeled structure of claim 33 wherein each of the first and second sets of wheel elements is comprised of at least a first end wheel element, an intermediate wheel element and a second end wheel element and wherein at least the first end wheel element of each of the first and second sets of wheel elements is rotatably coupled to the flipper element.

35. The wheeled structure as in claim 32 or 54 further comprising an axle, rotatably coupled to at least one wheel element in each of the first and second set of wheel elements, wherein the wheel element is rotatably coupled to the body at a greater transverse displacement from a longitudinal centerline of the body than at least one other wheel element in the corresponding set of wheel elements.

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36. The wheeled structure as in claim 32 or 54 wherein each of the first and second sets of wheel elements is comprised of at least a first end wheel element, an intermediate wheel element and a second end wheel element, and wherein the intermediate wheel element is rotatably coupled at a greater transverse displacement from a longitudinal centerline of the body than at least one other wheel element in the set of wheel elements.

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37. The wheeled structure of claim 36 wherein the intermediate wheel element in each of the first and second sets of wheel elements is always in contact with the ground plane, and the first end wheel element and the second end wheel element are selectively in contact with the ground plane.

38. The wheeled structure of claim 32 further comprising an articulation element, wherein the body comprises first and second body portions, the first body portion being pivotally coupled to the second body portion via the articulation element, and wherein the first body portion is the flipper element.

39. The wheeled structure of claim 38 wherein the articulation element is a hinge.
40. The wheeled structure of claim 38 wherein the articulation element is a pivot.
41. The wheeled structure of claim 38 wherein the articulation element is a flexible body portion.
42. The wheeled structure of claim 39 wherein the first and second body portions each include at least one wheel element of each of the first and second sets of wheel elements rotatably coupled to the respective body portion.
43. The wheeled structure of claim 32, wherein each first and second set of wheel elements is arrayed with a selected degree of rocker of the wheel elements coupled to the body, to enable the wheeled structure to turn-in-place.
44. The wheeled structure of claim 32 wherein the drive module comprises:
  - 5 independent drive elements arranged to drive the first and second wheel elements; and
  - motion control elements for controlling rotation of the respective wheel elements to enable longitudinal movement, turns or turns-in-place.

45. The wheeled structure of claim 32 wherein at least one wheel element is comprises of raised blocks spaced apart circumferentially.
46. The wheeled structure of claim 32 wherein at least one wheel element is scalloped.
47. The wheeled structure of claim 32 wherein at least one wheel element is studded.
48. The wheeled structure of claim 32 wherein at least one wheel element is substantially smooth.
49. The wheeled structure of claim 37 wherein at least the intermediate wheel element in each set of wheel elements is substantially smooth, and at least the first and second end wheel elements in each set of wheel elements are comprised of raised blocks spaced apart circumferentially.
50. The wheeled structure of claim 33, wherein the flipper element is pivotally coupled to the body to provide support to the body when the wheeled structure traverses inclined terrain.
51. The wheeled structure of claim 33, wherein the flipper element is pivotally coupled to the body to provide support to the body when the wheeled structure ascends stairs.

52. The wheeled structure of claim 33, wherein the flipper element is pivotally coupled to the body to provide support to the body when the wheeled structure descends stairs.
53. The wheeled structure of claim 33 wherein the wheel element coupled to the flipper element can make selective contact with the ground plane
54. The wheeled structure of claim 32 wherein each wheel element of the first and second sets of wheel elements has a defined radius such that there is no overlap between adjacent wheel elements of the first and second sets of wheel elements.
55. The wheeled structure of claim 54 wherein the wheel elements of the first and second sets of wheel elements, respectively, are aligned in a row.
56. The wheeled structure of claim 55 wherein each of the first and second sets of wheel elements is comprised of at least a first end wheel element, an intermediate wheel element, and a second end wheel element, and wherein the intermediate wheel element is always in contact with the ground plane, and the first and second end wheel elements are selectively in contact with the ground plane.